The indications for the simultaneous bilateral operation in unilateral cases of calculus have already been stated. It would not be appropriate to do this operation in any case in which the surgeon judged that the first kidney operated upon would probably be capable, by its own unaided work, of sustaining the life of the patient, but only when the contrary is true.

The additional shock involved in the operation upon the second kidney, when it is done at the same time as the operation upon the first, is but little greater than that of the unilateral operation, so far as we may judge from my experience up to the present time. Both organs can be incised and drained very quickly, unless there are unusually difficult conditions present, such as adhesions, that necessitate a longer and slower procedure. It is true that any surgical intervention of magnitude, such as nephrotomy, carries with it a very considerable danger to life when it is undertaken under conditions such as those under consideration; but the condition, left to itself or but partially relieved, is far more dangerous than the complete operation is ever likely to be in the cases in which I have suggested the employment of the bilateral procedure.

The appended table of 16 cases is taken from the whole number of 33 in the series of 187 cases which I collected, and in which I believe that the renal conditions were such as would have made the simultaneous bilateral operation better than the unilateral one. The latter was practised in all but 6 of the cases (those already referred to); in 4 others a bilateral operation was done, with an interval between the two procedures. These 4 cases were those of Cabot, Kümmel, and Ransohoff. All these patients lived; in none of them was there a simultaneous blocking of the two ureters, while in the other 6 it was present. The renal conditions were also more favorable in the 4 than in the 6 patients. In no single instance in which a unilateral operation alone was done, did the patient live.

THE IMPORTANCE OF MODIFICATIONS OF THE SENSIBILITY IN THE DIAGNOSIS OF DISEASE.

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Many of the difficulties in the examination of the sensibility were inherent in the imperfect methods due to a former want of knowledge of the different modalities of this function. These have been solved by the researches of Head[1] and his colleagues, who have shown that there are three distinct and different modes in the periphery. These are not, as it was formerly thought, touch, temperature, and pain, but consist of:

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[1] Brain, 1905, xxviii, 99, 115.

1. *Deep Sensibility.* The fibers subserving this originate in the muscle spindles and analogous bodies, and accompany motor nerves and those in tendon, joint, and connective tissue in general. They are stimulated by molar alteration of relative pressure and are expressed in terms of pressure and attitude. They are also susceptible to vibration, and when powerfully stimulated transmit painful impulses. Symptomatically, their involvement causes ataxia and partial astereognosis.
2. *Epicritic sensibility,* passing by the cutaneous nerves and conveying impressions of (*a*) light touch, (*b*) fine distinctions of coolness and warmth, (*c*) the appreciation of two or more spots touched simultaneously, along with localization.
3. *Protopathic sensibility,* by which one perceives only the extremes of heat and cold, and by which, although tactile and painful impressions are perceived, they seem vague and are badly localized, being often referred to other parts of the body or even to the exterior.

Head[2] believes that it is this form of sensation which is stimulated in visceral disease, and he lays stress upon the discomfort of an inexplicable kind which often accompanies stimulation of these fibers. It is manifested especially on hairy parts on lightly drawing a needle across a part retaining only protopathic sensations, and resembles the feeling of shivers many people experience upon hearing or feeling the rubbing of silk or the squeaking of a door. Of all our sensations, this is probably the least differentiated phylogenetically. Head thinks it is probably that part of the afferent arc which expresses itself efferently in the pilomotor, vasomotor, and secretomotor reflexes. This, unlike the epicritic system, does not contain specific end-organs for heat and for cold. Recent researches of Gordon Wilson[3] indicate that it is the only system represented in the cutaneous tympanum, which contains no end organs and is insensitive to touch, coolness, and warmth.

This is the form of sensibility which Sherrington[4] was investigating when he demonstrated the enormous overlapping of the distribution of cutaneous nerves. The areas of supply of epicritic nerve-groups do not encroach at all upon neighboring territory.

To Head's belief, however, Mackenzie[5] cogently urges that viscera do not respond to any of the methods of stimulation which are effective in provoking protopathic sensations in the cutis. He inclines to believe that their sensations are autonomic, and ascribes our occasional consciousness of them to the erethism their stimulation

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[2] Brain, 1905, xxviii, 116, 338.

[3] Reports of the Hull Laboratory of the University of Chicago, 1907.

[4] Schäfer's Text-book of Physiology, 1900.

[5] Brit. Med. Jour., 1906, p. 1449.

causes in a metamere to which their sympathetic afferent nerve fibers run. The erethism thus induced is manifested when one stimulates other afferent neurones of this segment, as touching the skin or pinching the muscles subserved by it, or even by a general stimulus of the whole spinal cord, as when startled. The commotion thus caused, though having little general effect, yet activates as a match to powder any area at high tension. Familiar examples of this high tension are seen in rabies, tetanus, strychnine poisoning, and spastic paraplegia, all characterized by a very slight stimulus producing a very great reaction.

The most striking example of such erythism is afforded in angina pectoris, in which the visceral spasm leads to an erethism of the eighth cervical and first and second thoracic spinal segments, resulting in an irradiation of pain along their sensory distribution, and a hyperalgesia over the same part. A reflection of a purely autonomic kind may be produced in the same region by rubbing the skin of the mamma with flannel—when a peculiar creepy sensation runs from the chest down the inside of the arm. This is often accompanied by a pilomotor contraction in the same region and by a dilatation of the homolateral pupil, and occasionally by a similar sensation on the cheek. By means such as these we can effectually exclude suggestion in interpreting the sensations, and thus remove them from the domain of hysteria, already too greatly burdened.

While these are the modalities of the sensibility distinguishable in the periphery, the groupings are very different within the spinal cord, where all painful impulses run together heterolaterally in Gowers' tract, very closely accompanied by the impulses of cold and heat. The impulses derived from the position of the limbs of which we become conscious pass homolaterally in the posterior column, while those of which we are unconscious, but which regulate tonus and automatic involvement, pass toward the cerebellum homolaterally in the dorsal spinocerebellar tract and heterolaterally in the ventral spinocerebellar tract and in the tractus spinothalmicus et tectalis. The impulses for touch, here accompanied by pressure, also take two courses, a homolateral in the posterior column for a few segments only, and a heterolateral probably in the anterior column (Page May).[6]

METHODS OF INVESTIGATION IN PRACTICE. 1 *Epicritic Sense:* (*a*) By drawing soft cotton-wool over the skin; (*b*) by localization; (*c*) by a pair of compasses; (*d*) by test-tubes between 22° and 47° C.

2. *Protopathic Sense:* (*a*) By test-tubes nearer the freezing and the boiling points; (*b*) by the prick of a pin; (*c*) by an iron-cored faradic current.

3. *Deep Sensibility:* (*a*) By pressure on the part; (*b*) by altering the attitude of the limb and asking the patient to describe or imitate

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[6] Brain, 1906

the new position; (*c*) by the estimation of weights (muscular sense); (*d*) by the estimation of deep pain with the algometer. The tuning fork affects all these modes, and they are all necessary in stereognosis.

4. *Cerebellar Sense:* (*a*) By the chair-mounting test; (*b*) by the diadocokinesis; (*c*) by the revolving platform; (*d*) by the static equilibrium test.

Another law influencing sensory modifications is that of homolaterality. Lebar and Jacquet[7] have shown that a hemihyperesthesia may occur during acute inflammation of any part of the body, and that it may be transferred to the opposite side by the intervention of a more severe inflammation at the reverse side of the body; for example, a fulminating focus of pleuropulmonary tuberculosis may be accompanied by an intense hemihyperesthesia; the breaking out of a focus in the opposite lung, or even the eruption of a wisdom tooth, may transfer the hyperesthesia to the opposite side. The characteristic implication of the platysma myoides muscle enables one to exclude the role of suggestion in these cases.

These considerations make, perhaps, only more needful the precautions against the influence of suggestion upon both patient and examiner while examining the sensibility, while they in no way invalidate the physiological law of summation, and the psychological law of reëducation, on account of which it is the first examination of the patient which is of paramount importance; and though they render the success of simulation more difficult, yet it becomes a more delicate task to unmask a trickster who is well instructed and clever (Bernheim[8]).

Experience teaches the neurologist to view with the greatest scepticism all evidence depending upon the statements of the patient, knowing empirically how they are fallacious even when without intent to deceive; and knowing psychologically that this must be so, on account of the very defective power of observation and introspection of the untrained laity. Some of the traps devised are: (1) La piège du peaucier of Jacquet; (2) Mankopf's pulse sign; (2*a*) pupil dilation sign; (3) simultaneous pressure trap; (4) faradic current trap; (5) counting touches; (6) diversion of attention.

CLINICAL TYPES: *Cerebral Anesthesia.* (Déjèrine,[9] Roussy[10]). Organic hemianesthesia may resemble that of functional type when the lesion is situated in the cortex, corona radiata, thalamus, or lemniscus; that is to say, the defect will involve all modalities of sensation in the same area; but the organic form differs in its incompleteness, being most marked at the extremities and in the fact that it passes or falls short of the middle line, although the loss of sensibility there is only partial. When the lesion is near the optic thalamus, hemianopsia may occur. It is always accompanied by hemiataxia and astereognosis of the cerebral type, and usually by very painful subjective sensations, particularly in the shoulder-joint. The preponderance is upon the sense of attitudes, the condition is nearly always preceded by fugitive hemiplegia, and is often followed by a posthemiplegic choreoathetosis.

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[7] Thèse de Paris, 1906.

[8] L'Hypnotism et la suggestion, 1891.

[9] Séminologie du système nerveux (in Traité de Médecine de Bouchard Brissaud), 1900.

[10] Le syndrome thalamique, Thèse de Paris, 1907.

When cranial nerve symptoms are added to the foregoing, it can safely be said that the lesion is in the mid-brain or pons; in the latter it causes trembling, cerebellar asynergia, dysarthria, and palsy of associated lateral movements of the eyes with nystagmus on looking up or down. A hemianesthesia of subcortical origin requires a lesion so vast as to involve the motor projection fibers, and is therefore accompanied by a marked hemiplegia. But when cortical, an anesthesia is never completely segmental and is more conspicuous distally, especially with regard to localization and stereogenesis, as Bonhoffer[11] insists. He believes paresthesia originates in projection fibers.

Kütner[12] has demonstrated that mono-anesthesia is always cortical unless residual. Déjèrine, however, believes it impossible to differentiate between cortical, subcortical, and capsular anesthesia unless in the case of the thalamic syndrome already cited. Kütner believes the pressure and vibration senses are the least affected. Friedrich Müller[13] agrees that it is the sense of attitudes and stereognosis which manifest the greatest disability, and that the further from the cortex, the more stable is the disturbance and the more are attacked the senses of pain, touch, and temperature.

An interesting case is that of Liepmann,[14] in which there was no loss of cutaneous sensibility, but much diminution of the deep sense in a case operated upon for infantile hemiplegia.

The hysterical anesthesias are characterized by being completely removable by suggestion, and susceptible of returning under the same influence at the will of the operator (Babinski[15] Williams[16]).

The history of their onset is generally traceable to imitation or perhaps even more often to unguarded medical examination, as in the case in which the doctor gleefully related, "The boy had no anesthesia at first, but I examined him most carefully the second time, and found the foot anesthetic; on the third occasion the leg became so, and the defect then extended up the whole limb." The stigmata are valuable corroboratively, but only as proof of suggestibility, beyond which they have no validity. The pupillary reaction to pain occurs in organic cases as well as functional cases, unless that particular afferent path is interrupted.

The fact that the anesthesia is most marked in the most paralyzed limb affords no real help to diagnosis; for this is apt to be the case by suggestion as well as by morphological contiguity. Nor is variability so safe a criterion as generally postulated; for Egger's[17] researches have shown how variable modifications of sensibility often are even when due to organic changes. The fugitive character of pain when present is, however, in favor of hysteria, speaking generally, as is the invariableness of the kind of esthetic perturbation; this is contrary to teaching in text-books, which are also erroneous in stating that distribution of disturbed sensation in spots is probably hysterical (Déjèrine),[18] for, as a matter of fact, such anomaly is very common in tabes and other radicular affections, and occurs also in multiple and mixed sclerosis of the cord. Involvement of all the special senses is hardly possible from purely organic causes, although the commonness of organic "point d'appui" for any hysterical clinical picture should prevent us from denying any organic element, even when hysterical factors bulk largely in the case.

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[11] Deut. Ztsch. f. Nervenh., 1904, xxvi, 5 to 7.

[12] Monats. f. Psy. und Neur., 1905, xvii, 312.

[13] Sammlung klin. Vort., 1905, Nos. 394 and 395, series xiv.

[14] Neurol. Zentralbl., 1904, p. 740.

[15] Conference devant l'Internat., 1906, "Ma Conception de l'Hystérie."

[16] International Clinics, September, 1908.

As regards unilateral deafness, an organic lesion may be excluded by Gellé's test of consensual synergic response upon politzerization of the affected side.

Cord Lesions. The Brown-Séquard syndrome is characterized by complete dissociation of sense of attitudes from deep pain, as Head[19] has proved, as well as the well-known crossed loss of temperature and pain sense. The disputes regarding the loss of tactile sensibility were due, as Head has shown, to the faulty methods then employed; for a touch by the finger of the observer stimulates not only tactile but deep sensibility.

In some of these cases there is further dissociation between tactile discrimination (ascertained by Weber's circle) and tactile localization. The loss of the former is always accompanied, when due to a cord lesion, by loss of sense of passive position. Moreover, tactile localization is never impaired unless the sensitivity to touch is also diminished.

The syndrome of syringomyelia is another dissociated one, again made possible by the intramedullary regrouping of sensory impulses, for the interruption is almost confined to the heterolateral temperature and pain paths, all of which run to Gowers' tract. All forms of pain are equally involved, deep, epicritic, and protopathic, and neither protopathic nor epicritic appreciation of temperature is possible. In the exceptional cases of gliosis confined to the posterior horn no syringomyelic dissociation is present, for in this situation the sensory impulses are not yet regrouped, and hence are all involved.

The lesion of multiple sclerosis does not, as a rule, entirely interrupt the conductivity of axones, but it interferes with the equable flow, and leads to rapid fatigue, as demonstrated by the tuning-fork, for which the duration of perception diminishes often over 50 per cent. (Egger[20]). The functional disability derived from this defect is practically nil, except as regards tonus regulating impulses, the marked interference with which is shown by the intentional tremor (of which nystagmus is part) and the incoördination.

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[17] Rev. neurol., 1904.

[18] Pathogenesis of Tabes Dorsalis, AMER. JOUR. MED. SCI., August, 1908.

[19] Brain, 1906.

Radicular Anesthesias. A type of esthetic perturbation very important from a diagnostic point of view is the radicular, found conspicuously in the symptomatic sciaticas, and enabling one to localize, and often, by so doing, to infer, the nature of the pathological process at work (Lortad-Jacob,[21] Déjèrine,[22] Carnus[23]). The radiculitis of tuberculous or syphilitic pachymeningitis is of this kind. The diagnosis of these conditions from the symptomatic sciatic of spondylitis or other arthritic lesion is made by the sensory loss being so clearly radicular. Of course, one must exclude referred pains of visceral inflammation and of joint conditions, themselves, by the use of Lesègue's sign and the watching of the opposite leg, which is drawn up too when a true sciatic irritation is produced.

In the upper extremity band anesthesias are very common, and again signify a radicular affection. Through the embryonic twisting not being so great as in the lower extremity, nerve trunk involvements are less readily distinguished from those of the roots. Acroparesthesia of only a few fingers should lead to a careful investigation of objective changes in the sensibility (Morriston Davis[24]). They may be due to angina pectoris, supernumerary rib, tabes, spondylitis, tuberculous pachymeningitis, etc.

In the trunk, the residual pains of an old zona must be excluded before being referred to some affection of a deep-seated organ or bone growth. A band hypoesthesia will often clinch the diagnosis of such cases.

In the neck and face also an esthetic modification of radicular distribution often enables a distinction to be made between simple neuralgia and involvement of nerve roots. For instance, a marked pharyngeal hypoesthesia may occur in the course of spondylitis or Pott's disease. Most helpful in diagnosis are, first, the algesia when the spinal accessory is involved by a diseased lateral sinus; second, the anesthesia of the tympanic membrane and external meatus occurring during certain otalgias, and enabling us to refer many of these hitherto obscure cases to their origin in a herpetic inflammation of the geniculate ganglion, thus saving us much unnecessary meddling with the tympanum (Ramsay Hunt[25]); and third, the pain and anesthesia in the distribution of the ophthalmic division of the fifth nerve when the carotid artery is aneurysmal or the cavernous sinus diseased.

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[20] Rev. neurol., 1906.

[21] Rev. de med., 1905, xxv, 817.

[22] Loc. cit.

[23] Les radiculitis, Paris, 1908.

[24] Rev. neur. and psych. 1907.

[25] Jour. Nerv. and Ment. Disease, February, 1907.